

1 13442-63

EWI(j)/EPF(c)/EWT(m)/BDS

ASD PC-4/Pr-4 JAJ/RM/WW

NR: AP3000692

8/0190/63/005/005/0670/0673

67

66

Chang, Han-Ming; Kolesnikov, G. S.

carbon-chain polymers and copolymers. 47. Graft copolymers of polyhydroxy-
undecanoic acid and polyhydroxyundecanoate with styrene-maleic anhydride copolymer

Usseskomolekulyarnyye soyedineniya, v. 5, no. 5, 1981, 510-513

carbon-chain polymers, copolymers, graft copolymers, polyesters,
undecanoic anhydride, polyhydroxyundecanoate, polyhydroxyundecanoate, styrene

In earlier paper by the authors reported the production of graft co-
polymer polyoxypelargonate with styrene-maleic acid anhydride copolymer. In
this work the authors studied the effect of polyhydroxyundecanoate (PHUD) and
polyhydroxyundecanoate (PHEA) on the graft copolymer obtained from their reaction with
styrene-maleic acid anhydride copolymer (SMAC). To this end SMAC was allowed to
react for 24 hours at 150C with either PHUD or PHEA in the presence of 1% n-toluene
as solvent. It was shown that with an increase in the amount of PHUD in the
reaction mixture the resulting graft copolymer shows on x-ray examination a more
orderly (crystalline) structure, and its swelling capacity in benzene goes up.
The formation of a more orderly (crystalline) graft polymer was also linked with the
length of the C-C chain in the corresponding polyester. Thus, it takes 33.3% of

E-13547-63

ACCESSION NR: AP3000692

to produce the same effect as that obtained from 70% of PHKA. The infrared spectrum of the graft copolymer shows absorption bands at 1200, 1700-1750, and 2200 cm⁻¹, none of which appear in the SMAC infrared spectrum. The authors wish to thank I. Kitaygorodskiy and his associates for the x-ray analysis of the graft copolymers and N. A. Chumayevskiy for the spectroscopic study of the issuing and the polymers. Orig. art. has: 2 figures and 2 tables.

ASSOCIATION: Institut elementoorganicheskikh soedineniy AN SSSR (Institute of Organometal Compounds, Academy of Sciences SSSR)

11 Oct 61

DATE ACQ: 17 Jun 63

ENCL: 00

NO REF SOV: 002

OTHER: 000

Word 2/2

KOLESNIKOV, G.S.; RODIONOVA, Ye.F.; SAFARALIYEVA, I.G.

Carbochain polymers and copolymers. Report No.52: Relative activity of vinylphosphinic acid esters in copolymerization with styrene. Izv. AN SSSR. Ser. khim. no.11:2028-2031 N '63. (MIRA 17:1)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.

1. Summary

Researcher, A. Polyakov, reported on the results of molecular
spectroscopy of the vapor of the compound in which work where
the reaction was conducted on the basis of the art. has:
1. 1. 1.

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the reaction was conducted on the basis of the art. has:
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Card 2/3

...
... of mixtures. X-ray analysis showed that the ordering of the
... with decreasing ... PVP was polymerized with vinyl
... for 30 hrs at 70°C in the presence of 0.2 % azoisobutyric di-

... Institut elementoorganicheskikh soedineniy AN SSSR (In-
stitute of Elemental Organic Compounds AN USSR,

SUBMITTED: September 18, 1961

U.S. PATENT OFFICE
3451, 3211

AUTHORS: Soboleva, T. A., Suprun, A. P., Kolesnikov, G. S.

Carbochain polymers and copolymers. VIII. Study of the effect of various factors on the polymerization of 1,1,1-trichloro-1,3-butadiene

Vysokomolekulyarnyye soedineniya, v. 11, no. 1, 1969, 387-391

effects of the nature and concentration of the initiator, the temperature and the reaction time were studied as well as the molecular weight and molecular structure of the polymer obtained by mass polymerization of 1,1,1-trichloro-1,3-butadiene. Results: (1) At 80°C and with a reaction time of 30 min and an initiator concentration of 0.5 mole% the polymers had η_{sp}/c and intrinsic viscosities in benzene at 25°C (dl/g) of 0.38 and 0.19, respectively, with benzoyl peroxide 0.5, 0.38; with azoisobutyric dinitrile 0.5, 0.38; with tert-butyl peroxide 0.5, 0.19; with cumene hydroperoxide 0.5, 0.17; with tri-n-propyl boron 0.5, 0.17; and without initiator 0.5, 0.17. (2) The effect of the initiator concentration was investigated with benzoyl peroxide at 80 and 230 min reaction time. The initiator concentration was 0.5, 1.0, 2.0, 4.0, 8.0, 16.0, 32.0, 64.0, 128.0, 256.0, 512.0, 1024.0, 2048.0, 4096.0, 8192.0, 16384.0, 32768.0, 65536.0, 131072.0, 262144.0, 524288.0, 1048576.0, 2097152.0, 4194304.0, 8388608.0, 16777216.0, 33554432.0, 67108864.0, 134217728.0, 268435456.0, 536870912.0, 1073741824.0, 2147483648.0, 4294967296.0, 8589934592.0, 17179869184.0, 34359738368.0, 68719476736.0, 137438953472.0, 274877906944.0, 549755813888.0, 1099511627776.0, 2199023255552.0, 4398046511104.0, 8796093022208.0, 17592186044416.0, 35184372088832.0, 70368744177664.0, 140737488355328.0, 281474976710656.0, 562949953421312.0, 1125899906842624.0, 2251799813685248.0, 4503599627370496.0, 9007199254740992.0, 18014398509481984.0, 36028797018963968.0, 72057594037927936.0, 144115188075855872.0, 288230376151711744.0, 576460752303423488.0, 1152921504606846976.0, 2305843009213693952.0, 4611686018427387904.0, 9223372036854775808.0, 18446744073709551616.0, 36893488147419103232.0, 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3533694129556768659166595001485837031654967793751237916243212402585239552.0, 7067388259113537318333190002971674063309935587502475832486424805170479104.0, 14134776518227074636666380005943348126619871175004951664972849610340958208.0, 28269553036454149273332760011886696253239742350009903329945699220681916416.0, 56539106072908298546665520023773392506479484700019806659891398441363832832.0, 113078212145816597093331040047546785012958969400039613319782796882727665664.0, 226156424291633194186662080095093570025917938800079226639565593765455331328.0, 452312848583266388373324160190187140051835877600158453279131187530910662656.0, 904625697166532776746648320380374280103671755200316906558262375061821325312.0, 1809251394333065553493296640760748560207343510400633813116524750123642650624.0, 3618502788666131106986593281521497120414687020801267626233049500247285301248.0, 7237005577332262213973186563042994240829374041602535252466099000494570602496.0, 14474011154664524427946373126085988481658748083205070504932198000989141204992.0, 28948022309329048855892746252171976963317496166410141009864396001978282409984.0, 57896044618658097711785492504343953926634992332820282019728792003956564819968.0, 115792089237316195423570985008687907853269984665640564039457584007913129639936.0, 231584178474632390847141970017375815706539969331281128078915168015826259279872.0, 463168356949264781694283940034751631413079938662562256157830336031652518559744.0, 926336713898529563388567880069503262826159877325124512315660672063305037119488.0, 1852673427797059126777135760139006525652319754650249024631321344126610074238976.0, 3705346855594118253554271520278013051304639509300498049262642688253220148477952.0, 7410693711188236507108543040556026102609279018600996098525285376506440296955904.0, 14821387422376473014217086081112052205218558037201992197050570753012880593911808.0, 296427748447529460284341721622241044104371160744039

Carbochain polymers and ...

S/190/63/005/004/003/020
B101/B220

... 33.5, 0.35; 1.5, 99.5, 0.20. (3) The polymer yield with 0.5
... and 240 min reaction time was 30% at
... 30. (4) Under the same conditions, the polymer
... at 40 min. The polymer yield was 30% after 60 min and 30% after
... time. The intrinsic viscosity of the polymer was 0.15
... min but thereafter very small. The polymer obtained
... benzoyl peroxide, 0.5 g, 100 ml, 100°C, 240 min.
... obtained were: yield 30%, intrinsic viscosity 0.15
... specific weight 1.15, refractive index 1.45, and
... the IR spectrum of the polymer showed a strong absorption band
... that the polymer has a considerable number of OH and CH groups
... this makes a further study of the mechanism of this
... There are 4 figures and 1 table.

... Institut elementoorganicheskikh soedinenii, 1961, "In-
... stitute of Elemental Organic Compounds of ... 1961

Card 2/2 September 2, 1961

KOLESHNIKOV, G.S.; RODIONOVA, Ye.F.; FEDOROVA, L.S.; MEDVED', T.Ye.;
KABACHNIK, M.I.

Carbochain polymers and copolymers. Part 43: Synthesis,
polymerization, and copolymerization of aromatic esters of
vinylphosphinic and α -chlorovinylphosphinic acids. Vysokom.
soed. 5 no.1:32-38 Ja '63. (MIRA 16:1)

1. Institut elementoorganicheskikh soedineniy AN SSSR.
(Phosphinic acid) (Polymerization)

EPR (EW) (m)/EWP(j)/EPP(c)/BDS AFFTC/ASD P. 1, P. 2

AP305488

5/11/75 0070/0075

Lesnikov, S. S., (Doctor of chemical sciences)

Results and perspectives of polymer chemistry

At. Zhuk. Vestnik, no. 5, 1963, 70-75

Polymer chemistry

...for the progress of the chemical industry as a whole and of its ... in particular is given to the realization of the ... of the Central Committee of the Soviet Communist party. ... capital investment in the chemical industry amount to four ... resulting in increases of 100% in the production of synthetic ... materials, 150% in synthetic rubber ... of in ... output, and 100% in the number of tires manufactured. Since ... of polymers and monomers has become one of the leading fields ... research of the Academy of Sciences, USSR and other republics. ... devoted to the synthesis of new ... compounds ... complex properties required by today's technology. The synthesis ... polymers was advanced, producing heat-resistant materials with

AP3005488

electrical properties. A wide scope of work was devoted to the synthesis of flammable polymers containing phosphorus as well as fluoropolymers 7
stability. Much attention was given (in the Academy's institutions) to the processes of macromolecule formation. A theory of anionic polymerization developed on the basis of investigations dealing with polymerization kinetics, and the study of polymerization of olefins and dienes led to a better understanding of chain growth and the role played by the crystalline lattice. The method of polypropylene synthesis developed by the Academy is of great importance for large industrial developments, as was the process of polymerization. In the field of synthetic fibers great advances were made in the polyvinyl fiber, the capron cord, and the modification of polymers. The field of structural mechanics of the polymers became a priority in the production of polymers possessing special properties. Much was given to the subject of polymer aging and to the methods of testing. A. N. Semenov suggested the setting up of a new branch of science related to the study of the behavior of polymers under working conditions. The importance of studies of lacquers and varnishes was also stressed. The priority problems is so enormous that it will require the expansion of research facilities and the establishment of new ones, as well as the training of the cadres of qualified scientific workers and engineers. One

AP3/06400

such a need is indicated in the address given by N. S. Khrushchev
of industrial and building workers on April 24, 1963, where
it is pointed out that the research cadres could be enlarged by drawing on the
graduates of the institutions of higher education.

File

DATE ACQ: 06Sep63

ENCL: 00

SIR CODE: CH, AD

NQ REF SOV: 000

OTHER: 000

Card 3/3

KOLESNIKOV, G.S.; DAVYDOVA, S.L.; SHMAL'TS, A.M.; SHALINA, N.A.

Polyesters of antimonous and chloroantimonous acids. Izv.AN
SSSR.Otd.khim.nauk no.2:368-373 F '63. (MIRA 16:4)

1. Institut elementoorganicheskikh soedineniy AN SSSR.
(Antimonic acids)

S/062/63/000/002/015/020
B144/B186

AUTHORS: Gurgenedze, G. T., Kolesnikov, G. S., and Li Fyn-ying

TITLE: Carbochain polymers and copolymers. Communication 51. Graft copolymers from aliphatic ω -hydroxycarboxylic acids and the copolymer of styrene with N-(ω -carboxy-n-hexyl)methacryl amide

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye khimicheskikh nauk, no. 2, 1963, 365 - 368

TEXT: Based on previous studies (Izv. AN SSSR. Otd. khim. n. 1962, 897), graft copolymers were obtained by polycondensing ω -hydroxy enanthic (I), or ω -hydroxy pelargonic acid (II), with the 50:1 copolymer (III) of styrene and N-(ω -carboxy-n-hexyl) methacryl amide obtained at 80°C in the presence of benzoyl peroxide. For III, the thermomechanical properties, the intrinsic viscosity (0.43 dl/g), the mean composition (C 91.81 %, H 7.77 %), and the Huggins' factor (0.43) were determined. The length of the side chains of the graft copolymer depended on the ratio of III to I or II. Polycondensation was effected in chloro benzene at 130 - 135°C in the presence of 2 % by weight p-toluene sulfonic acid (with respect to I or II) within 30 hrs. The length of the polyester side chains was derived from the C content of the

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Carbochain polymers and...

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B144/B186

graft copolymers according to the formula published previously. It increased with increasing initial concentrations of I or II. The increasing Huggins' factor and decreasing intrinsic viscosity prove that the symmetry of the macromolecules is enhanced when the side chains grow longer. For side chains, with equal polymerization coefficients, the symmetry was higher in the graft copolymers of II than in those of I, corresponding to a longer main chain in the polyester of II. This supports an earlier suggestion (Vysokomolek. soed. 1, 1733 (1959)) that the symmetry depends on the interaction of the side chains in the macromolecule. The ordering of the graft copolymers increased with increasing length of the side chains. Methanolysis effected complete splitting-off of the graft side chains; its final product had the same intrinsic viscosity and Huggins' factor as the initial copolymer. The softening point decreased when the side chains grew longer. This proves that the side chains (interdistance 133) have only a plastifying effect. There are 1 figure and 1 table. /

ASSOCIATION: Institut elementoorganicheskikh soedineniy Akademii nauk SSSR
(Institute of Elemental Organic Compounds of the Academy of Sciences USSR)

SUBMITTED: April 2, 1962
Card 2/2

KOLESNIKOV, G.S., otv. red.; ANDRIANOV, K.A., red.; DOQADKIN, B.A., red.; DOLOPOLOSK, B.A., red.; YENIKOLOFYAN, N.S., red.; KARGIN, V.A., red.; KOZLOV, P.V., red.; KOROTKOV, A.A., red.; KORSHAK, V.V., red.; LAZURKIN, Yu.S., red.; MEIWEDEV, S.S., red.; MIKHAYLOV, N.V., red.; PASYNSKIY, A.G., red.; SLONIMSKIY, G.L., red.; SMIRNOV, V.S., red.; TSVETKOV, V.N., red.; FREYMAN-KRUPENSKIY, K.A., tekhn. red.

[Carbochain high-molecular weight compounds] Karbotaepnye vysokomolekuliarnye soedineniya; sbornik statei. Moskva, Izd-vo AN SSSR, 1963. 287 p. (MIRA 17:1)

KOLESNIKOV, G.S., otv. red.; ANDRIANOV, K.A., red.; DOGADKIN, B.A., red.; DOLGOPLOSK, B.A., red.; YENIKOLOPYAN, N.S., red.; KARGIN, V.A., red.; KOZLOV, P.V., red.; KOROTKOV, A.A., red.; KORSHAK, V.V., red.; LAZURKIN, Yu.S., red.; MEDVEDEV, S.S., red.; MIKHAYLOV, N.V., red.; PASYNSKIY, A.G., red.; SLONIMSKIY, G.L., red.; SMIRNOV, V.S., red.; TSVETKOV, V.N., red.; FREYMAN-KRUPENSKIY, D.A., tekhn. red.

[Heterochain high-molecular weight compounds] Geterotsepnnye vysokomolekuliarnye soedineniia; sbornik statei. Moskva, Izd-vo "Nauka," 1963. 246 p. (MIRA 17:3)

KOLESNIKOV, G.S., otv. red.

[Cellulose and its derivatives] TSelliuloza i ee proiz-
vodnye; sbornik statei. Moskva, Izd-vo AN SSSR, 1963. 194 p.
(MIRA 17:10)

KOZLOV, P.V., otv. red.; ANDRIANOV, K.A., red.; DOGADKIN, B.A., red.;
DOLGOPLOSK, V.A., red.; YENIKOLOPYAN, N.S., red.; KARGIN,
V.A., red.; KOLESNIKOV, G.S., red.; KOROTKOV, A.A., red.;
KORSHAK, V.V., red.; LAZURKIN, Yu.S., red.; MEDVEDEV, S.S.,
red.; MIKHAYLOV, N.V., red.; PASYNSKIY, A.G., red.;
SLONIMSKIY, G.L., red.; SMIRNOV, V.S., red.; TSVETKOV, V.N.,
red.; FREYMAN-KRUPENSKIY, D.A., tekhn. red.

[Adhesion of polymers] Adgeziia polimerov; sbornik statei.
Moskva, Izd-vo AN SSSR, 1963. 142 p. (MIRA 16:10)
(Polymers) (Adhesion)

KOLESNIKOV, G.S.; RODIONOVA, Ye.F.; FEDOROVA, L.S.; MEDVED', T.Ya.;
KABACHNIK, M.I.

Carbochain polymers and copolymers. Part 41: Synthesis,
polymerization, and copolymerization of vinylphosphinic
amides. Vysokom.sped. 4 no.9:1385-1389 S '62. (MIRA 15:11)

1. Institut elementoorganicheskikh soedineniy AN SSSR.
(Phosphinic amide)
(Polymerization)

158070

38893

S/190/62/004/007/009/009
B119/B180

AUTHORS: Kolesnikov, G. S., Davydova, S. L., Klimentova, N. V.
TITLE: Carbochain polymers and copolymers. XL. Polymerization and copolymerization of methacrylic and acrylic derivatives containing germanium
PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 7, 1962, 1098-1102

TEXT: Copolymerizing methacrylyl triethyl germanium with styrene at 60°C the authors found the relative activities of the two components to be 0.93 ± 0.08 and 1.05 ± 0.02 respectively. The following new compounds were synthesized: $\text{CH}_2=\text{C}(\text{CH}_3)\text{COOGe}(\text{C}_4\text{H}_9)_3$ (1) (b.p. 130-132°C at 4 mm Hg; d_{20}^{20} 1.0166; n_D 1.4602 at 20°C); $\text{CH}_2=\text{C}(\text{CH}_3)\text{COOGe}(\text{C}_6\text{H}_5)_3$ (2) (m.p. 180°C); $\text{CH}_2=\text{C}(\text{CH}_3)\text{COOGe}(\text{C}_6\text{H}_{11})_3$ (3) (m.p. 82-84°C); $\text{CH}_2=\text{CHCOOGe}(\text{C}_2\text{H}_5)_3$ (4) (b.p. 88-90°C at 12 mm Hg; d_{20}^{20} 1.1530; n_D 1.4582 at 20°C); $\text{CH}_2=\text{CHCOOGe}(\text{C}_4\text{H}_9)_3$ (5) (b.p. 131°C at 4 mm Hg;

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37442

S/190/62/004/005/019/026
B110/B108

15.92.01

AUTHORS: Kolesnikov, G. S., Suprun, A. P., Soboleva, T. A., Yerzhova, V. A., Bondarev, V. B.

TITLE: Carbochain polymers and copolymers. XXXIX. Copolymerization of 1,1,2-trichlorobuta-1,3-diene with other unsaturated compounds

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 5, 1962, 743-748

TEXT: Determinations were made of the relative activities of 1,1,2-trichlorobuta-1,3-diene and styrene (10:90; 25:75; 50:50; 75:25; and 90:10) and of the composition of their copolymers at low degrees of conversion (5 - 7%). On the basis of the relative activities $r_1 = 0.07 \pm 0.03$ (styrene) and $r_2 = 1.18 \pm 0.08$ (trichlorobutadiene), the composition of the copolymer was plotted versus the composition of the monomer mixture. In order to raise the softening point ($\sim 50^\circ\text{C}$) of polytrichlorobutadiene, 1,1,2-tri-

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Carbochain polymers and copolymers...

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B110/B108

chlorobuta-1,3-diene was copolymerized with acrylonitrile, vinyl chloride, and bicyclo-(2,2,1)-hepta-2,5-diene. During bulk copolymerization with acrylonitrile at a ratio of 50:50, only 10 mole% of acrylonitrile radicals was added to the copolymer. Thereupon, copolymerization was also carried out in a water-oil emulsion (1.8:1) with mersolate as an emulsifier, and benzoyl peroxide and ammonium persulfate as initiators. With the use of ammonium persulfate, only trichlorobutadiene homopolymers could be obtained from mixtures of 10 - 80 mole% of trichlorobutadiene and benzoyl peroxide. With acrylonitrile radicals of less than 40 mole%, the copolymer was completely soluble in toluene, while with more than 40 mole%, it was only partially soluble. Extraction of a partially soluble copolymer with toluene gave two fractions: (1) 88% by weight of a white, powder, soluble in toluene and containing 39 mole% of acrylonitrile radicals; (2) a yellow powder, soluble only in dimethyl formamide and containing 65 mole% of acrylonitrile radicals. Either powder possessed a low softening point, but their thermomechanical curves differed considerably. The copolymerization of 1,1,2-trichlorobuta-1,3-diene with vinyl chloride was also carried out in an emulsion, whereby solid lumps and lattices were obtained at the

Card 2/3

35001

S/190/62/004/003/021/023

B124/B101

15.8070

AUTHORS: Kolesnikov, G. S., Gurgenzidze, G. T.

TITLE: Carbon chain polymers and copolymers. XXXVIII. Interaction of isotactic polymethyl methacrylate with polyethylene azelate

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 3, 1962, 452 - 454, 386

TEXT: Isotactic polymethyl methacrylate (PMMA) was prepared by polymerizing methyl methacrylate in toluene in the presence of butyllithium; the prepared product was heated in methyl ethyl ketone for 20 hours. The intrinsic viscosities of both heated and unheated PMMA were found to be 0.52 in both cases. Both thermomechanical properties and X-ray data show a higher degree of orderliness in heated PMMA. Polyethylene azelate (PEA) was synthesized from equimolar amounts of ethylene glycol and azelaic acid reacted first in a current of dry nitrogen, and then at a residual pressure of 2 - 3 mm Hg. The intrinsic viscosity of the product was found to be 0.18. Equilibrium quantities of heated isotactic PMMA and PEA were dissolved in chlorobenzene, a few drops of concentrated HCl were added (pH ~5),
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Carbon chain polymers and ...

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B124/B101

and the mixture was heated to 120°C in a current of dry, pure nitrogen for 22 hours. The reaction products were precipitated with n-hexane, dried to constant weight at 50°C in vacuo, dissolved in toluene and reprecipitated by progressive dilution with n-hexane, whereby three fractions were obtained. The first of these fractions representing about 60% of the overall weight of the product was washed three times with methyl ethyl ketone and heated in methyl ethyl ketone for 20 hours. The intrinsic viscosity of the grafted copolymer which was found to be 0.42 is lower than that of the starting PMMA which is 0.52; the intrinsic viscosity of PMMA recovered from the grafted copolymer by methanolysis was 0.52. The decrease of the intrinsic viscosity on grafting lateral polyester chains to PMMA is due not to degradation of the main polymer chain, but to a change of the PMMA macromolecule in solution which, in turn, is assumed to be due to the interaction of the lateral polyester chains leading to a more symmetrical three-dimensional shape of the polymer molecule. This fact is reflected by a value of 0.46 of the Huggins constant for the initial PMMA and PMMA recovered from the grafted copolymer by methanolysis, while this value is 0.65 for the grafted copolymer. The lowered softening temperature of the grafted copolymer and the increased softening temperatures of the most isotactic polymers

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which are both due to heating can be explained to be a consequence of the three-dimensional orientation of the main polymethylmethacrylate chain which leads to a decrease of the orderliness of packets consisting of lateral polyester chains which is reflected by the decrease of the softening temperature of the grafted copolymer. This change of orderliness of the bundles is not significant enough to be visible on usual X-ray diagrams, but it is evident from the thermomechanical properties. There are 2 figures and 7 references: 6 Soviet and 1 non-Soviet. The reference to the English-language publication reads as follows: M. L. Huggins, J. Amer. Chem. Soc. 64, 2716, 1942. ✓

ASSOCIATION: Institut elementoorganicheskikh soedineniy AN SSSR
(Institute of Elemental Organic Compounds of the AS USSR)

SUBMITTED: March 15, 1961

Card 3/3

KOLESNIKOV, G. S.

43

PHASE I BOOK EXPLOITATION

SOV/6034

Konferentsiya po khimii i primeneniyu fosfororganicheskikh soyedineniy. 2d, Kazan', 1959.

Khimiya i primeneniye fosfororganicheskikh soyedineniy; trudy (Chemistry and Use of Organophosphorus Compounds; Conference Transactions) Moscow, Izd-vo AN SSSR, 1962. 630 p. Errata slip inserted. 2800 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Kazanskiy filial.

Resp. Ed.: A. Ye. Arbuzov, Academician; Ed. of Publishing House: L. S. Povarov; Tech. Ed.: S. G. Tikhomirova.

PURPOSE: This collection of conference transactions is intended for chemists, process engineers, physiologists, pharmacists, physicians, veterinarians, and agricultural scientists.

COVERAGE: The transactions include the full texts of most of the scientific papers presented at the Second Conference on the Chemistry and Use of

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43

Chemistry and the Use of Organophosphorus (Cont.)

SOV/6034

Organophosphorus Compounds held at Kazan' from 2 Nov through 1 Dec 1959. The material is divided into three sections: Chemistry, containing 67 articles; Physiological Activity of Organophosphorus Compounds, containing 26 articles; and Plant Protection, containing 12 articles. The reports reflect the strong interest of Soviet scientists in the chemistry and application of organophosphorus compounds. References accompany individual reports. Short summaries of some of the listed reports have been made and are given below.

TABLE OF CONTENTS:[Abridged]:

Introduction (Academician A. Ye. Arbuzov)

3

TRANSACTIONS OF THE CHEMISTRY SECTION

Gefter, Ye. L. [NII plastmass (Scientific Research Institute of Plastics, Moscow)]. Some Prospects for the Industrial Use of Organophosphorus Compounds

46

Card 2/10

Chemistry and the Use of Organophosphorus (Cont.)

SOV/6034

Korshak, V. V., T. M. Frunze, V. V. Kurashev, and L. V. Kozlov [Institute of Organoelemental Compounds]. Synthesis of Some Phosphorus-Containing Dicarboxylic Acids and Derivation of Polyamides Based on Such Acids

247

Phosphorus-containing dicarboxylic acids have been obtained by synthesis and used for the preparation of polyamides. The effect of the phosphorus and the structure of the acids on the properties of the polyamides has been studied.

Kolesnikov, G. S., Ye. F. Rodionova, and L. S. Fedorova [Institute of Organoelemental Compounds]. Synthesis, Polymerization, and Copolymerization of Esters of Vinylphosphonic Acid

255

The authors obtained esters of vinylphosphonic acid and demonstrated that these esters are capable of entering the polymerization and copolymerization reaction with other monomers. Polymers and copolymers of the dichloride and esters of vinylphosphonic acid have been synthesized and their properties determined.

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3/4

Chemistry and the Use of Organophosphorus (Cont.)

SOV/6034

Andreyeva, M. A., I. A. Gribova, M. I. Kabachnik, G. S. Kolesnikov, V. V. Korshak, T. Ya. Medved', Yu. M. Polikarpov, Ye. F. Rodionova, and L. S. Fedorova [Institute of Organoelemental Compounds]. Some Methods of Synthesis of New Organophosphorus Monomers and Polymers 263

This study attempts to develop new methods of synthesis of organophosphorus monomers and polymers for obtaining high-molecular fireproof materials. The authors synthesized vinyl compounds of pentavalent phosphorus and studied their properties, as well as those of the polymers obtained.

Moshkin, P. A., Ye. L. Geft'er, and I. K. Rubtsova [Scientific Research Institute of Plastics]. Study of the Synthesis and Uses of Some Organophosphorus Compounds in the Plastics Industry 279

Industrial methods for the preparation of esters of phosphoric acid and for testing qualities of these acids as plasticizers have been developed, along with methods for obtaining phosphorus-containing monomers for use in polymerization, copolymerization, and polycondensation reactions. Polyesters based on dichlorides of

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S/06/62/000/011/019/021
B117/B101

AUTHORS: Kolesnikov, G. S., and Gurgeniidze, G. T.

TITLE: Synthesis of graft copolymers from isotactic polymethyl methacrylate and polyhydroxyenamate.

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye khimicheskikh nauk, no. 11, 1962, 2097-2098

TEXT: Crystalline graft copolymers with heterogeneous hydrocarbon chains were synthesized from the isotactic polymethyl methacrylate and from the polyhydroxyenamate obtained by polycondensation of ω -hydroxyenanthic acid (molecular weight, 7400; intrinsic viscosity, 0.22 dl/g (benzene, 20°C)) in chlorobenzene solution at 120°C under an atmosphere of nitrogen. The yield of the reaction product precipitated from a 4% solution in C_6H_5Cl having eight times the volume of the n-hexane amounted to 85% of the total weight of the compounds used. After precipitation with n-hexane, three fractions were separated at 20°C by coarsely fractionating a 2% benzene solution of the reaction product. Fractions I and II were found to be graft copolymers containing polyhydroxyenamate and having side chains with

Card 1/2

S/062/62/000/011/020/021
B117/B101

AUTHORS: Kolesnikov, G. S., and Pogosyan, G. M.
TITLE: Synthesis and polymerization of 2-n-octyl oxystyrene
PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye khimicheskikh nauk, no. 11, 1962, 2098-2099

TEXT: 2-n-octyl oxystyrene was synthesized from β -(2-n-octyl oxyphenyl) ethyl alcohol in the presence of caustic potash and hydroquinone, using the same method as the authors proposed in Izv. AN SSSR, Otd. khim. n. 1958, 227 for synthesizing 4-methoxystyrene. The new compound has b.p. 135-137°C (3 mm Hg), n_D^{20} 1.5089, d_4^{20} 0.9332; yield 18%. Besides the monomer a large quantity of polymer formed during dehydration. Polymerization was carried out in a nitrogen atmosphere in the presence of benzoyl peroxide at 100°C in sealed ampoules. A solid, transparent polymer with a vitrification temperature of 130°C was obtained.

Card 1/2

15.8150
11.2210

34500
S/190/62/004/003/020/023
B124/B101

AUTHORS: Rodionova, Ye. F., Kolesnikov, G. S., Fedorova, L. S.,
Gavrikova, L. A.

TITLE: Carbon chain polymers and copolymers. XXXVII. Polymerization
and copolymerization of diphenyl vinylphosphinate

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 3, 1962, 448-451

TEXT: The results of a study performed on the polymerization of diphenyl vinylphosphinate (DVP) and its copolymerization with styrene and acrylonitrile are presented. DVP was mass-polymerized in nitrogen at 60°C in sealed tubes in the presence of one of the following initiators: benzoyl peroxide, tert-butyl hydroperoxide, and azoisobutyronitrile. DVP was further copolymerized with styrene in mass and in emulsion. With increasing DVP content in the starting monomer mixture, the yield and the intrinsic viscosity of the resulting copolymer decrease. When a molar ratio of DVP and styrene equal to 25:75 is used, 2 molar % of the initiator are added, and the mixture is copolymerized at 72.5°C, a yield of 75% of the copolymer is attained after 7 - 8 hours which remains practically unchanged.

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Carbon chain polymers ...

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in the further course of copolymerization. When temperature is lowered from 72.5 to 60°C, the intrinsic viscosity is raised to its double value; lowering of the concentration of the initiator has an analogous effect. When the mentioned two monomers were copolymerized in emulsion at 50°C in nitrogen and in the presence of ammonium persulfate for 36 hours, a copolymer containing about 2% of phosphorus, with an intrinsic viscosity of 1.57 and a molecular weight of 113,000 was obtained. When DVP is copolymerized with o-methylstyrene under conditions similar to those used with styrene, the yield of the copolymer is about the same as with styrene with the phosphorus content being somewhat higher. The vitrification point of the copolymer with o-methylstyrene is somewhat higher than that of the copolymer with styrene. The intrinsic viscosity of a 0.5% solution of the DVP-acrylonitrile copolymer in dimethyl formamide decreases with increasing content of the phosphorus-containing component; the yield of the copolymer after 8 hours of copolymerization varies but little with the composition of the starting mixture in the range of DVP concentrations studied. In all cases, the copolymer contains less of the phosphorus-containing component than the starting mixture. Thanks are due to S. A. Pavlova for the determination of the molecular weight. There are 2 figures, 6 tables, and 4 Soviet

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B124/B101

references.

ASSOCIATION: Institut elementoorganicheskikh soedineniy AN SSSR (Institute
of Elemental Organic Compounds of the AS USSR)

SUBMITTED: March 14, 1961

Card 3/3

KOLESNIKOV, G.S.; GURGENIDZE, G.T.

Carbochain polymers and copolymers. Report No.49: Graft copolymers obtained from methacrylate of *W*-oxyanthic acid polyester and methacrylyltriethylstannane or methacrylyltriethylgermane. Izv.AN SSSR.Otd.khim.nauk no.7:1275-1279 JI '62.

(MIRA 15:7)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Heptanoic acid) (Tin organic compounds)
(Germane)

37404
S/062/62/000/005/007/008
B110/B101

53832
AUTHORS: Kolesnikov, G. S., Gurgenidze, G. T., and Li-Fing-ying
TITLE: Carbochain polymers and copolymers. 48. Synthesis of graft copolymers with different graft frequency and length of the side chains

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye khimicheskikh nauk, no. 5, 1962, 897-902

TEXT: The dependence of the properties of graft copolymers on their structure was studied by way of the polycondensation of ω -hydroxy- α -naphthoic acid with the copolymer obtained from styrene and α -carboxy-n-hexyl methacrylate $[\text{CH}_2=\text{C}(\text{CH}_3)\text{COO}(\text{CH}_2)_6\text{COOH}]$. By polymerizing mixtures of styrene and α -carboxy-n-hexyl methacrylate (I) of different composition, copolymers with different content of I were obtained. Their carboxyl groups polycondensed with aliphatic ω -hydroxycarboxylic acids, whereby the mean statistical distance between the possible places for the grafting of the polyester side chains could be modified. In the copolymerization of I with styrene it was established that the mean statistical distance

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Carbochain polymers and copolymers ...

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B110/B101

in graft copolymers rises with the length of graft side chains. No matter what the graft frequency, a good ordering degree is found with a coefficient of side chain polymerization larger than 10. Conclusions: Grafting of short polyhydroxyenante chains shifts the thermomechanical curves to higher temperatures as compared with initial copolymers. Thus, the fusion temperature of graft copolymers of the type described rises at optimum graft frequencies and coefficients of side chain polymerization. In the methanolysis of some graft copolymers it was found that the lengths of macromolecules remain the same during the synthesis of graft copolymers. α -carboxy-n-hexyl methacrylate, polymerized for 20 hrs at 70°C in the presence of 2% by weight of benzoyl peroxide, was insoluble in benzene, chloroform, alcohol, and other organic substances, and softened at -70°C. There 2 figures and 3 tables.

ASSOCIATION: Institut elementoorganicheskikh sovedineniy Akademii nauk
SSSR (Institute of Elemental Organic Compounds of the
Academy of Sciences USSR)

SUBMITTED: December 15, 1961
Card 3/3

KOLESNIKOV, G.S.; DAVYDOVA, S.L.; YAMPOL'SKAYA, M.A.; KLIMENTOVA, N.V.

Interaction of mono- and dicarboxylic acids with trialkyl derivatives
of boron and aluminum. Izv. AN SSSR, Otd.khim.nauk no.5:841-844
My '62. (MIRA 15:6)

1. Institut elementoorganicheskikh soedineniy AN SSSR.
(Boron organic compounds) (Aluminum organic compounds)
(Acids, Organic)

5.3630

S/081/62/000/023/119/120
B117/B186

AUTHORS:

Andreyeva, M. A., Gribova, I. A., Kabachnik, M. I.,
Kolesnikov, G. S., Korshak, V. V., Medved', T. Ya.,
Polikarpov, Yu. M., Rodionova, Ye. F., Fedorova, L. S.

TITLE:

Some methods of synthesizing new organophosphorus monomers
and polymers

PERIODICAL:

Referativnyy zhurnal. Khimiya, no. 23, 1962, 816, abstract
23R58 (In collection: Khimiya i primeneniye fosfororgan.
soyedineniy. M., AN SSSR, 1962, 263 - 271)

TEXT: This is a review of the authors' papers on synthesizing vinyl com-
pounds of quinquivalent P and polymers based on them. Syntheses of various
derivatives of vinyl phosphinic and vinyl thiophosphinic acid, and of
diethyl vinyl phosphinic oxide, have been described. The production of some
new phosphorus-containing polymers and copolymers with carbo-chains and
heterogeneous chains is described. 13 references. [Abstracter's note:
Complete translation.]

✓B

Card 1/1

S/081/62/000/023/118/120
B117/B186

AUTHORS: Kolesnikov, G. S., Rodionova, Ye. F., Fedorova, L. S.
TITLE: Synthesis, polymerization, and copolymerization of vinyl phosphinic esters
PERIODICAL: Referativnyy zhurnal. Khimiya, no. 23, 1962, 816, abstract 23R57 (In collection: Khimiya i primeneniye fosfororganich. sovedineniy. M., AN SSSR, 1962, 255 - 262)

TEXT: Vinyl phosphinic esters (VPE) were synthesized by dehydrochlorination of the corresponding β -chloroethyl phosphinic esters. Catalysts of the ion type ($AlCl_3$, $TiCl_4$, Na) proved ineffective for polymerizing VPE. VPE were block-polymerized at 50°C in N_2 atmosphere and in the presence of radical initiators. The polymerization is accelerated by enlarging the alkyl radical of VPE (methyl ester being an exception). VPE that contain radicals with equal numbers of C atoms in the principal chain polymerize at the same rate. VPE polymers are soluble in dichloro ethane, insoluble in C_6H_6 and CCl_4 . Copolymers of VPE with acrylonitrile, vinyl acetate, and vinyl chloride were

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Synthesis, polymerization, and...

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B117/B186

obtained. In copolymerization, VPE are less reactive than the comonomers mentioned. Polymerization and copolymerization of vinyl phosphinic chloride was also investigated. [Abstracter's note: Complete translation.]

Card 2/2

KOLESNIKOV, G.S., prof.

Graft copolymers. Priroda 50 no.12:96-98 D '61. (MIRA 14:12)

1. Institut elementoorganicheskoy khimii AN SSSR, Moskva.
(Macromolecular compounds)

15.8150 2209

29735
S/190/61/003/011/004/016
B124/B101

AUTHORS: Korshak, V. V., Fedorova, L. S., Kolesnikov, G. S.
TITLE: Synthesis of polyarylenealkyls. XII. Polycondensation of
1,2-dichloroethane with phenyl bromide
PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 11, 1961, 1650-1654

TEXT: Polycondensates of 1,2-dichloroethane with phenyl bromide were prepared in the presence of $AlCl_3$ using the same method as that described by the authors in Refs. 1 (Izv. AN SSSR, Otd. khim. n., 1955, 359) and 2 (Izv. AN SSSR, Otd. khim. n., 1958, 53) except that dibromodiphenyl ethane and diphenyl ethane were distilled off in vacuo after driving off the solvent and after conclusion of the reaction. The molecular weight of the polymer obtained was determined viscosimetrically, and the constant K_m in the Staudinger equation was assumed to be equal to $1.8 \cdot 10^{-4}$. With decreasing phenyl bromide excess in the reaction mixture, both the molecular weight and the yield of polycondensation products are increased; maximum values are obtained with a phenyl bromide - dichloroethane ratio

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Synthesis of polyarylenealkyls...

29735
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B124/B101

of 0.95. When phenyl bromide - dichloroethane ratios of 1.2 and less are used, three-dimensional products are formed. The bromine content was 28.7 % in soluble poly(bromophenylene)ethyl and 21.5 % in the three-dimensional polycondensation product, while the theoretical bromine content is 43.7 %. This circumstance is attributed to the fact that migration of bromine takes place during polycondensation which leads to the formation of an inhomogeneous, halogen-substituted polymer. The yields of polymers (Fig. 1) and the molecular weights (Fig. 2) of the polycondensates of dichloroethane with phenyl chloride, fluoride, and bromide, respectively, decrease in the order: phenyl fluoride > phenyl chloride > phenyl bromide which is due to the fact that steric hindrance increases with the size of the halogen substituent. Optimum catalyst concentration of 8 mole% with respect to maximum molecular weight of poly(bromophenylene)ethyl was established (Table 2). The low-molecular reaction products were rectified to yield two fractions, one of which was identified to be dibromodiphenyl ethane and the other to be diphenyl ethane. It was shown by structural analysis by means of destructive oxidation with chromosulfuric acid that, due to partial conversion of the phenyl bromide to benzene which takes part in polycondensation, a copolymer forms in the course of the relative

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polycondensation. There are 2 figures, 2 tables, and 6 references:
3 Soviet and 3 non-Soviet.

ASSOCIATION: Institut elementoorganicheskikh soedineniy AN SSSR
(Institute of Elemental Organic Compounds AS USSR)

SUBMITTED: December 1, 1960

Fig. 1. Influence of the phenyl halide - dichloroethane ratio on the yield of polymer and low-molecular fractions: (1), (2), (3) yield of polymer; (1a), (2a), (3a) yield of low-molecular products; (1), (1a) phenyl fluoride; (2), (2a) phenyl chloride; (3), (3a) phenyl bromide.
Legend: (A) Yield, %; (B) phenyl halide - dichloroethane ratio.

Fig. 2. Influence of the phenyl halide - dichloroethane ratio on the molecular weight of the polymer. (1) benzene; (2) phenyl fluoride; (3) phenyl chloride; (4) phenyl bromide. Legend: (A) Molecular weight; (B) phenyl halide - dichloroethane ratio.

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Synthesis of polyarylenealkyls...

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Table 2. Polycondensation of dichloroethane with phenyl bromide (phenyl bromide - dichloroethane ratio 1.3:1, reaction temperature 100°C, reaction time 4 hr). Legend: (A) Aluminum chloride concentration, mole% of dichloroethane; (B) obtained, % of theory; (c) low-molecular reaction products³; (D) poly(bromophenylene)ethyl; (E) molecular weight of the polymer; (F) Mixture of soluble and three-dimensional polymers; (G)² of the soluble portion of the polymer; (H)³ the low-molecular products are conventionally considered to be dibromodiphenyl ethane.

Card 4/04

158160

29734

S/190/61/003/011/003/016
B124/B101

AUTHORS: Korshak, V. V., Fedorova, L. S., Kolesnikov, G. S.
TITLE: Synthesis of polyarylenealkyls. XI. Chemical properties
of poly(halophenylene)ethyls
PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 11, 1961, 1644-1649

TEXT: The degradation of poly(fluorophenylene)ethyl effected by phenyl fluoride, as well as the aspects of hydrogenation and of substituting a hydroxyl and an amino group, respectively, for the halide atom in poly(halophenylene)ethyl were studied in this paper. The effect of the phenyl fluoride concentration on the degradation of poly(fluorophenylene)ethyl (I) has been investigated using a weight ratio of AlCl_3 to (I) equal to 1:4, constant temperature (100°C) and reaction time (4 hr), while the phenyl-fluoride - I ratio was varied. The molecular weight of the initial (I) was 3810; results are presented in Table 1. Data obtained for a phenyl-fluoride - I weight ratio of 5:1, at constant temperature (100°C) and reaction time (4 hr), and varied AlCl_3 - I ratio

Card 1/04

Synthesis of polyarylenealkyls...

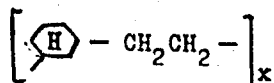
29734
S/190/61/003/011/003/016
B124/B101

are given in Table 2 and, finally, results obtained with a constant phenyl-fluoride - I weight ratio of 5:1, constant $AlCl_3$ concentration of 2.5 per cent by weight of the polymer, constant temperature ($100^\circ C$) and varied reaction time are presented in Table 3. From these results, it can be concluded that phenyl fluoride effects degradation of the polymer, and that the intensity of this degradation is influenced by the ratio of the initial substances, catalyst concentration, and the time of the degradation process. Hence, it follows that phenyl fluoride acts both as a component of chain formation and as a degradation agent in polycondensation with dichloroethane. From the fact that no hydrolysis occurs when poly(chlorophenylene)ethyl is heated to $300^\circ C$ with water in a ratio of 1:10 in the digester, the conclusion may be drawn that the mobility of the chlorine atom in (II) is very low. When (II) is heated with aqueous KOH, hydroxyl groups are substituted for chlorine, and linear molecules formed are cross-linked by oxygen bridges; the properties of the products depend on the amount of reacted KOH. Neither degradation of (II) nor substitution of an amino group for chlorine has been effected by aqueous ammonia solutions. Poly(cyclohexylene)ethyl

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Synthesis of polyarylenealkyls...

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B124/B101



forms when (II) is hydrogenated in benzene in the presence of Raney's nickel catalyst which is not accompanied by degradation. There are 3 tables and 6 Soviet references.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy AN SSSR
(Institute of Elemental Organic Compounds AS USSR)

SUBMITTED: December 1, 1960

Table 1. Degradation of poly(fluorophenylene)ethyl by phenyl fluoride.
Legend: (I) Weight ratio of phenyl fluoride to poly(fluorophenylene)ethyl;
(II) obtained, % of the initial substances; (III) of low-molecular
reaction products; (IV) of poly(fluorophenylene)ethyl; (V) molecular weight
of the polymer.

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Synthesis of polyarylenealkyls...

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B124/B101

Table 2. Degradation of poly(fluorophenylene)ethyl by phenyl fluoride.
Legend: (I) Weight ratio of aluminum chloride to poly(fluorophenylene)ethyl;
(II) yield, % of the initial substances; (III) of low-molecular reaction
products; (IV) of poly(fluorophenylene)ethyl; (V) molecular weight of the
polymer.

Table 3. Degradation of poly(fluorophenylene)ethyl by phenyl fluoride
(molecular weight of the initial polymer: 3250). Legend: (I) Reaction
time, hr; (II) obtained, % of the initial substances; (III) of low-
molecular reaction products; (IV) of poly(fluorophenylene)ethyl;
(V) molecular weight of the polymer. X

Card 4/4

PINO, P.; LORENTSI, D.P.; LARDICHCHI, L.; KIARDELLI, F.;
KOLESNIKOV, G.S. [translator]

Isotactic polymers of optically active α -olefins. Vysokom.
soed. 3 no.10:1597-1606 0 '61. (MIRA 14:9)

1. Pizanskiy universitet, Institut promyshlennoy organicheskoy
khimii.

(Olefins—Optical properties)

15.8100

27579

S/190/61/003/009/014/016

B124/B101

AUTHORS: Tseng Han-ming, Kolesnikov, G. S.

TITLE: Graft polymers and copolymers. XXXV. Graft copolymers of styrene with maleic anhydride and polyhydroxy pelargonate

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 9, 1961, 1415 - 1420

TEXT: The properties of graft copolymers having rigid and amorphous main chains and flexible and crystalline side chains are studied on the example of the system "amorphous copolymer of styrene and maleic anhydride (copolymer I) - polyhydroxy pelargonate". The polyhydroxy pelargonate reacts with maleic-anhydride fragments only like a monofunctional compound. Copolymer I contained 46.1 mole% of styrene fragments, and 53.9 mole% of maleic-anhydride fragments; its intrinsic viscosity was found to be 0.68 dl/g, and its Huggins constant was 0.216. Copolymer I was reacted with polyhydroxy pelargonic acid (HPA) without using a solvent, in a flow of nitrogen by heating first to 150°C for 12 hr, and afterwards to 170°C for 4 hr. The product was dissolved in benzene and precipitated with methanol. The intrinsic viscosity in a mixture of acetone and benzene
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S/190/61/003/009/014/016

B124/B101

Graft polymers and...

(1:1) at 20°C, the solubility, and the thermomechanical properties were determined, and the Huggins constant was calculated. The degree of order increases with the HPA content in the initial mixture; spherulites were found when the film was microscopically examined. Results are given in Table 1. The softening point is strongly reduced (from ~215°C to ~65°C) by grafting with polyhydroxy pelargonate. Then, the system copolymer I - polyhydroxy pelargonate (PHP) was investigated. With a PHP content of 33.3% by weight or less, amorphous products were obtained, whereas with PHP contents of 50% or more, crystalline products were recovered, the crystallinity of which increases with the PHP content. Swelling in benzene rises from 195% at 16.7% PHP to 1700% at 85% PHP. The thermomechanical properties of the graft copolymers are between those for copolymer I and for PHP; the softening point decreases with increasing PHP content and approaches that of pure PHP. The graft copolymer prepared from copolymer I and PHP shows, contrary to copolymer I, absorption bands at 1700 - 1750 and 1200 cm⁻¹ (characteristic of ester groups), and at 3000 cm⁻¹ (characteristic of the carboxylic group in carboxylic acids) in the infrared spectra. The thermomechanical properties of copolymers were determined with the device developed by B. L. Tsetlin and collaborators (Ref. 11: Zavodsk.

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Graft polymers and...

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B124/B 101

labor. 22, 352, 1956) using a load of 100 g and a piston, 4 mm in diameter. V. A. Kargin et al. (Ref. 8: Vysokomolek. soyed. 1, 114, 1959; Ref. 9: ibid. 1, 1547, 1959) is mentioned. The authors thank G. L. Slonimskiy and A. I. Kitaygorodskiy and their collaborators for determining the thermomechanical properties and for the X-ray structural analysis of the graft copolymers, and I. V. Obreimov and N. A. Chumayevskiy for the spectroscopical examination of the initial and the graft copolymers. There are 5 figures, 2 tables, and 11 Soviet references.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy AN SSSR
(Institute of Elemental Organic Compounds AS USSR)

SUBMITTED: December 31, 1960

Table 1. Graft copolymers recovered from the copolymer of styrene with maleic anhydride and ω -hydroxy pelargonic acid.

Legend: (1) Composition of the initial compound, % by weight; (2) copolymer I; (3) HPA; (4) yield of reaction products, % by weight of the

Card 3/4

15.8110

26302

S/190/61/003/008/015/019
B110/B208

AUTHORS: Krivosheyeva, I. A., Razumov, A. I., Kolesnikov, G. S.

TITLE: Studies in the series of derivatives of phosphinic and phosphinous acids. XIV. Study of polymerization of some unsaturated esters of ethyl phosphinic acid

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 8, 1961,
1247 - 1250

TEXT: Following a paper by A. I. Razumov (Dissertatsiya, Kazan', 1957) reporting on the polymerizability of unsaturated esters of the $R-P(O)(OR')\cdot OCH=CCl_2$ type, the authors studied the polymerization of these esters. Preliminary experiments with methyl-2, 2-dichlorovinyl ester of ethyl phosphinic acid (ME) and with the same ester of phenyl phosphinic acid in the presence of $AlCl_3$ at $100^\circ C$ were unsuccessful. The allyl-2, 2-dichlorovinyl ester of ethyl phosphinic acid (AE) was then synthesized. The following polymerization experiments were carried out with both esters: (1) at $100^\circ C$ in the presence of tert-butyl peroxide;

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Studies in the series...

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B110/B208

(2) at different temperatures in the presence of azoisobutyric acid dinitrile; (3) in methylene chloride medium at -50°C in the presence of 2 mole% TiCl_4 ; (4) in hexane medium at -20°C in the presence of butyl lithium (concentration of monomer 1 mole/liter, of the catalyst 0.03 - 0.05 moles/liter). In the case of AE, viscosity increased; with ME, no polymerization took place. Copolymerization of ME and AE with methyl methacrylate (MMA) and styrene was studied. The following was found: (1) with increasing concentration of the phosphorus-containing component, yield and intrinsic viscosity decrease, P and Cl content increase; (2) copolymers of AE and ME with styrene are not easily inflammable; (3) copolymers of ME + MMA burn; (4) only the copolymer AE + MMA containing 10% AE is completely soluble in acetone. The soluble copolymers AE + MMA are not easily inflammable, the insoluble ones do not burn; (5) the softening temperatures of copolymers of ME and AE with styrene differ only slightly from that of polystyrene. The thermomechanical properties of MMA copolymers were not studied. The authors thank G. L. Slonimakiy for determining the thermomechanical properties, S. R. Rafikov and S. A. Pavlova for determining the molecular weights. There are 1 figure, 2 tables, and 3 references: 2 Soviet-bloc and 1 non-Soviet-bloc. The reference to the

Card 2/3

Studies in the series...

26301 26302
S/190/61/003/008/015/019
B110/B208

English-language publication reads as follows: Ref. 2: C. L. Arkus,
R. J. S. Matthews, J. Chem. Soc., 1956, 4607.

ASSOCIATION: Kazanskiy khimiko-tehnologicheskii institut im. S. M. Kirova
(Kazan' Institute of Chemical Technology imeni S. M. Kirov)
Institut elementoorganicheskikh soyedineniy AN SSSR
(Institute of Elemental Organic Compounds AS USSR)

SUBMITTED: December 15, 1960

Card 3/3

KOLESNIKOV, G.S.; TSZEN KHAN'-MIN [TSêng Han-ming]

Carbochain polymers and copolymers. Part 34: Syntheses of graft copolymers by copolymerization and copolycondensation. Vysokom.-soed. 3 no.8:1210-1216 Ag '61. (MIRA 14:9)

1. Institut elementoorganicheskikh soedineniy AN SSSR.
(Methacrylic acid) (Polymerization)

15.8105

2209

23772

S/190/61/007006/015/019
B110/B208

AUTHORS:

Kolesnikov, G. S., Tseng Han-ming

TITLE:

Carbon chain polymers and copolymers. XXXIII. Copolymerization of methyl methacrylate with polyhydroxypelargonate containing a methacrylic end group

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 6, 1961, 919 - 924

TEXT: Grafted copolymers with ordered structure may be obtained from crystallizable side chains and amorphous polymethyl methacrylate. Polyhydroxypelargonate obtained by polycondensation of ω -hydroxypelargonic acid with methacrylic acid chloride, with an unsaturated end group, crystalline structure and intrinsic viscosity of 0.2 (benzene, 20°C) was used as the monomer. Different copolymers were obtained by a 6-hr block polymerization in the presence of 1 wt % benzoyl peroxide at 75°C. After reprecipitation from 2 - 3 % chlorobenzene solution, washing with methanol, drying in vacuo at 50°C they were dissolved in hot acetone and precipitated with methanol. All of them being dissolved in hot

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B110/B208

Carbon chain polymers and copolymers...

alcohol, they contained no polymethyl methacrylate. The table shows the results obtained. In order to determine the length of the resultant principal chain some samples were subjected to methanolysis. Polymethyl methacrylate of amorphous structure (according to X-ray analysis) was obtained and confirmed by ultimate analysis. Its wt % portion decreased with increasing content of polyhydroxypelargonate (PHP) in the initial mixture, i. e., with increasing degree of grafting. The carbon increase in the graft copolymer depends on the PHP content in the initial mixture and may be used for measuring the degree of grafting. The intrinsic viscosity of the methanolysis products was determined (in benzene at 20°C), and the Huggins constant was calculated (Figs. 3 and 4). According to Fig. 3 the intrinsic viscosity of the graft copolymers is smaller than that of the PMMA regenerated from them, its Huggins constant is higher than that of the corresponding graft copolymer. This indicates a higher molecular symmetry of the graft copolymers in solution. The decrease of intrinsic viscosity of graft copolymers and of regenerated PMMA with increasing PHP content is explained as follows: PHP is a more active monomer than PMMA, which slows down polymerization in excess quantities. PHP reacts with all radicals being present. The radicals thus formed

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Carbon chain polymers and copolymers...

are less active than those formed in the reaction of the polymer radical with PMMA, and do not easily react with excess PMMA. Short chains are formed which, in turn, react with the more active PHP. Molecular weights and intrinsic viscosity increase. It may be seen from Figs. 5 a and 6 that graft copolymers with 5 - 8 wt % PHP in the initial mixture have the highest softening temperatures, though containing the shortest principal chains. The crystalline polymerization products formed with PHP with 58.8 wt % (confirmed by X-ray structural analysis) dissolved in chlorobenzene to 63.6 %. The soluble portion had an intrinsic viscosity of 0.39 (benzene, 20°C), a Huggins constant of 0.12, maximum degree of swelling in chlorobenzene of 2,680 %, C content = 68.45 %; H content = 10.23 %. The following was found for the insoluble fraction: C = 68.46; H = 10.13. This trimer of low network density is probably the result of chain transfer with participation of the lateral polyester chains. Examination of films obtained from 20 wt % MMA and 80 wt % PHP in the polarizing microscope with crossed nicol prisms disclosed spherulite content. In this cases the side chains in the graft copolymer which may form ordered areas, also give rise to an ordered structure. Graft copolymers with ordered supermolecular structure, which is formed during their synthesis,

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Carbon chain polymers and copolymers...

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with known length of the side chain, and known average statistical distribution may thus be obtained by copolymerization of various unsaturated compounds with polymers having an unsaturated group. 150 g of 1, 1, 1, 9-tetrachlorononane were heated with 450 g 92 - 93 % H_2SO_4 under stirring for 2.5 hr to 65 - 80°C. 9-chloropelargonic acid was obtained with a boiling point of 136 - 137°C at 3 mm Hg, melting point of 19 - 20°C $n_D^{20} = 1.460$ (C = 56.10 %; H = 18.83 %, Cl = 18.44 %). According to the method by A. N. Nesmeyanov and L. J. Zakharkin (Ref. 4: Izv. AN. SSSR, Otd. khim. n., 1955, 224) 100 g 9-chloropelargonic acid and 40 g NaOH in 250 ml H_2O were heated with 65 g soda in 350 ml H_2O for 3 hr to 185 - 200°C. 82.4 g (91 %) 9-hydroxypelargonic acid were obtained (C = 62.02 %; H = 10.28%). Polyhydroxypelargonate was formed by polycondensation in the N_2 stream: 10 hr at 150°C, 2 hr at 170°C, 3 hr at 185°C, 2 hr at 200°C, 3 hr at 180°C (2 - 3 mm Hg), 2 hr at 200°C. 5 ml pyridine and 20 ml methacrylic acid chloride were added to 10 g polyhydroxypelargonate (intrinsic viscosity = 0.20) and 40 ml benzene at 10 - 15°C. 8.6 g PHP

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Carbon chain polymers and copolymers...

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B110/B208

with an intrinsic viscosity of 0.20 (benzene, 20°C), C = 68.42; H = 10.26, was obtained. P. Kh. Freydlina was thanked for the supply of 1, 1, 1, 9-tetrachlorononane, G. L. Slonimskiy, A. I. Kitaygorodskiy and co-workers for carrying out the measurements. There are 6 figures, 1 table, and 4 Soviet-bloc references.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy AN SSSR
(Institute of Elemental-organic Compounds AS USSR)

SUBMITTED: October 24, 1960

Card 5/10

KOLESNIKOV, G.S.; TSZEN KHAN'-MIN [Tseng Han-ming]

Carbochain polymers and copolymers. Part 32: Graft copolymers containing thiodivaloric acid groups in the side chains. Vysokom. soed. 3 no.4:637-641 Ap '61. (MIRA 14:4)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Polymers)

S/190/61/003/003/011/014
B101/B204

AUTHORS: Kolesnikov, G. S., Tseng Han-ming

TITLE: The classification of graft copolymers

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 3, 1961,
475-476

TEXT: On the basis of the classification suggested by V. V. Korshak (Ref. 1: Khimiya vysokomolekulyarnykh soyedineniy (Chemistry of high molecular compounds) Izd. AN SSSR, 1950, p. 339) the following classification is suggested for graft copolymers: I. Homochain lateral chains are grafted to the homochain main chain: homochain graft copolymer. II. To the homochain main chain heterochain lateral chains are grafted: heterochain graft copolymer. III. Heterochain lateral chains are grafted to the heterochain main chain: heterochain graft copolymer. IV. To the heterochain main chain homochain lateral chains are grafted: hetero-homochain copolymer. If polymers able to form ordered structures are described as crystalline, and such, as are not able to do so as amorphous, the further subdivision is made: A) Main- and lateral chain amorphous: ✓

Card 1/2

The classification of graft copolymers

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B101/B204

amorphous graft copolymer. B) Main chain amorphous, lateral chain crystalline; amorphous-crystalline graft copolymer. C) Main- and lateral chain crystalline: crystalline graft copolymer. D) Main chain crystalline, lateral chain amorphous: crystalline-amorphous graft copolymer. Example: Onto ordered (crystalline) polyamide, polystyrene is grafted: hetero-homochain crystalline-amorphous graft copolymer. This classification may be used for all copolymers. Their main- and lateral chains may be organic as well as inorganic. There is 1 Soviet-bloc reference. ✓

ASSOCIATION: Institut elementoorganicheskikh soyedineniy AN SSSR
(Institute of Elemental Organic Compounds, AS USSR)

SUBMITTED: September 15, 1960

Card 2/2

89994

S/190/61/003/003/010/014
B101/B204

15.8114

AUTHORS: Rodionova, Ye. F., Kolesnikov, G. S.

TITLE: Carbon-chain polymers and copolymers. XXXI. The polymerization and copolymerization of vinyl phosphinic acid chlorides

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 3, 1961, 459-463

TEXT: This is a continuation of the investigation of the polymerization of derivatives of vinylphosphinic acid carried out by the authors (G. S. Kolesnikov et al., Ref. 1: Vysokomolek. soyed., 1, 367, 1959; Ref. 2: *ibid.*, 1, 641, 1959; Ref. 3: *ibid.*, 2, 1432, 1960). The chloride of vinylphosphinic acid (VPC) was polymerized in ampoules, in nitrogen atmosphere at 50°C with an addition of 2% benzoyl peroxide or azoisobutyric acid dinitrile. The latter turned out to be the active initiator. Saponification of the polymer of VPC with water yielded polyvinylphosphinic acid, yield 88%, intrinsic viscosity 0.15. Reaction of the PVC polymer with benzyl alcohol (I), ω-hydroxy-enanthyllic acid (II) and ω-hydroxy-pelargonic acid (III) in dichloroethane gave derivatives of polyvinyl-

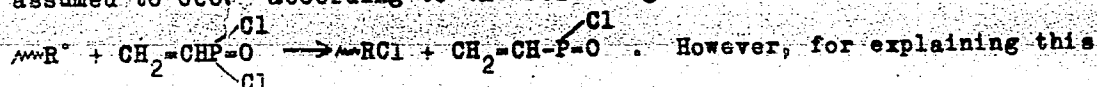
Card 1/6

89994

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B101/B204

Carbon-chain polymers and...

phosphinic acid. Polymer I, yield 19%, contained 25% benzyl groups and about 75% free OH groups. The softening temperature amounted to 50°C. At 200°C, the deformation was 20%, above 200°C, decomposition began. For II, the yield was 63.5%, softening temperature 50°C; for III: yield 37%, softening temperature 30°C. The table gives the results of the copolymerization of VPC with methylmethacrylate (in nitrogen atmosphere at 50°C). The decrease of molecular weight (and viscosity respectively) with a growing PVC content is believed to be due to the low activity of the radicals, which form from the polymer radical with PVC. The regrouping of this radical according to C. L. Arkus, R. J. S. Matthews (Ref. 4: J. chem. Soc., 1956, 4607) or breaking off of the reaction is assumed to occur according to the following scheme:



mechanism, further research work is necessary. Fig. 1a gives the thermomechanical properties of these copolymers. Under the effect of water upon these copolymers dissolved in dichloroethane, copolymers are formed from methylmethacrylate and vinylphosphinic acid, which are insoluble

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Carbon-chain polymers and...

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in dichloroethane, alcohol, dimethylformamide, and 8% NaOH. As is shown by Fig. 16, the softening temperature increases for this copolymer with a growing vinylphosphinic acid content. This is explained by the forming of hydrogen bonds between the polymer chains. The copolymerization of VPC with styrene was carried out at the same conditions as with methylmethacrylate. These copolymers were insoluble in benzene and ethyl acetate. Their thermal properties are shown by Fig. 16. Copolymerization of VPC with vinylacetate in the molar ratio 1 : 1 at 50° with 0.2 mole% azoisobutyric acid dinitrile after 1-2 hr led to a solid copolymer containing 58.7 mole% vinylacetate. This copolymer, which is soluble in dichloroethane easily reacted with water. Here, not only the chloride groups but also the ester groups are saponified, and a water-soluble copolymer of the vinylphosphinic acid with vinyl alcohol was formed. The authors thank M. I. Kabachnik for putting the VPC at their disposal, and G. L. Slonimskiy and his collaborators for determining the thermo-mechanical properties of the copolymers. There are 1 figure, 1 table, and 6 references: 5 Soviet-bloc and 1 non-Soviet-bloc. The reference to English-language publication is given in the text of the abstract.

X

Card 3/6

Carbon-chain polymers and...

89994

S/190/61/003/003/C10/014
B101/B204

ASSOCIATION: Institut elementoorganicheskikh soedineniy AN SSSR
(Institute of Elemental Organic Compounds of the AS USSR)

SUBMITTED:
September 2, 1960

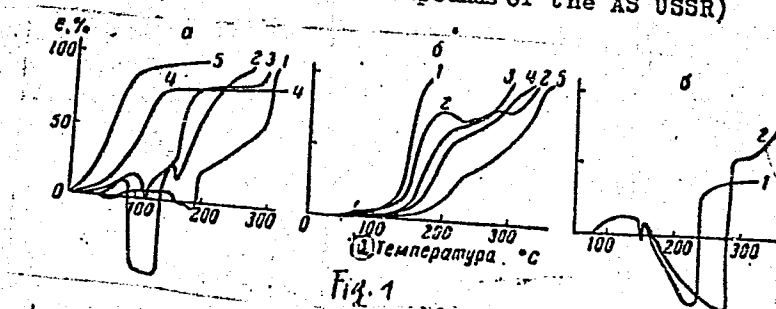


Fig. 1

Legend to Fig. 1a and 1b: mole% VPC: 1) 10; 2) 20; 3) 30; 4) 40; 5) 50; Fig. 1c: 1) 20; 2) 30; a) temperature.

Card 4/6

89993

15.8114

S/190/61/003/003/009/014
B101/B204

11.2214

AUTHORS:

Rodionova, Ye. F., Kolesnikov, G. S., Soborovskiy, L. Z.,
Gladshcheyn, B. M.

TITLE:

Carbon-chain polymers and copolymers. XXX. The copolymeriza-
tion of vinylsulfofluoride

PERIODICAL:

Vysokomolekulyarnyye soyedineniya, v. 3, no. 3, 1961,
456-458

TEXT: It was the purpose of the present work to obtain copolymers from
vinylsulfofluoride (M_1), produced from β -chloroethylsulfofluoride, with
(M_2): styrene, vinylacetate, methylmethacrylate and acrylonitrile. The
copolymerization was carried out at 50°C without solvent, in a nitrogen
atmosphere with 0.5 mole% azoisobutyric acid dinitrile. It lasted 25 hr.
The copolymers were dissolved and precipitated with methanol. Their
fluorine content and the softening temperature were determined. Table 1
gives the results. The good styrene copolymer yield and its softening
temperature which was higher than that of polystyrene gave rise to further

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89993

Carbon-chain polymers and...

S/190/61/003/003/009/014
B101/B204

experiments under the same conditions, but with a varied ratio between vinylsulfofluoride and styrene. The copolymerization took 49 hr. Table 2 gives the results. With a content of about 32 mole% styrene, an azeotropic copolymer is obtained. The figure shows the results of the thermomechanical investigation of these copolymers, carried out according to B. L. Tsetlin (Ref. 3: Zavodsk. labor., 32, 352, 1956). Equimolar mixtures of vinylsulfofluoride and styrene copolymerized in emulsion, after 7 hr resulted in a copolymer (in the presence of ammonium persulfate) with 6.85% F, yield 69%. Mention is made of the fact that polymerization of vinylsulfofluoride by means of benzoyl peroxide, azoisobutyric acid dinitrile or $TiCl_4$ was not successful. The authors thank G. L.

Slonimskiy and his collaborators for determining the thermomechanical properties, and S. A. Pavlova for determining the molecular weights. There are 1 figure, 2 tables, and 3 references: 2 Soviet-bloc and 1 non-Soviet-bloc. The reference to English-language publication reads as follows: USA Patent 2,653,973 (1953); Chem. Abstrs., 48, 8813, (1954)

ASSOCIATION: Institut elementoorganicheskikh soyedineniy AN SSSR
(Institute of Elemental Organic Compounds, AS USSR)

Card 2/4

89913

S/062/61/000/002/010/012
B115/B207

15.8114

AUTHORS: Zakharkin, L. I., Kolesnikov, G. S., Davydova, S. L.,
Gavrilenko, V. V., and Kamysheva, A. A.

TITLE: Dialkyl aluminum derivatives of saturated and unsaturated
acids

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh
nauk, no. 2, 1961, 364-365

TEXT: The authors aimed at obtaining dialkyl aluminum methacrylates and
acrylates and studying their properties. The compounds of the
(RCOO)_xAlR_{3-x} type have not yet been described in publications. First,
the authors tried to obtain salts of dialkyl aluminum and of fatty
acids by interaction of the potassium salts of these acids with
dialkyl aluminum chlorides, but without success probably due to complex
formation of organoaluminum compounds with KCl. Subsequently, the
authors applied the interaction of trialkyl aluminum with free
saturated and unsaturated acids by the following scheme:

Card 1/4

89913

S/062/61/000/002/010/012
B115/B207

Dialkyl aluminum derivatives of ...

$\text{RCOOH} + \text{AlR}_3 \longrightarrow \text{RCOOAlR}_2 + \text{R'H}$. The reaction proceeded in hexane or benzene under intensive stirring. The separation of saturated hydrocarbons in quantities close to calculations was observed in the reaction process. By this method, the following substances were obtained from dialkyl aluminum and saturated acids: diisobutyl aluminum acetate, diisobutyl aluminum propionate; from dialkyl aluminum and unsaturated acids: diethyl aluminum methacrylate, diethyl aluminum acrylate, and diisobutyl aluminum methacrylate. The substances obtained are transparent, colorless, easily distillable and viscous oils which fume in the air and inflame sometimes. The table shows their constants. Salts from dialkyl aluminum and unsaturated acids polymerize both thermally and in the presence of initiators such as dinitrile of azoisobutyric acid. They are viscous, transparent polymers which are nearly insoluble in organic solvents, and swell in some polar media such as amyl acetate or dimethyl formamide. Salts from dialkyl aluminum and unsaturated acids copolymerize well with methyl methacrylate and styrene in all ratios (1 : 0.5, 1 : 1, 1 : 2, 1 : 4, etc.), and are solid, transparent, vitreous polymers practically insoluble in organic solvents.

Card 2/4

S/026/061/000/012/003/003
D037/D113

AUTHOR: Kolesnikov, G.S., Professor

TITLE: Grafted copolymers

PERIODICAL: Priroda, no. 12, 1961, 96-98

TEXT: In the light of increasing demands for obtaining new polymeric compounds resistant to, for example, the effect of high temperatures and different types of radiation, such as encountered by the first astronauts, the author discusses the recently-developed method of obtaining copolymers by grafting. Copolymers obtained by grafting lateral branches of other polymers on the basic polymers retain some properties of the constituent polymers and also acquire new special features. The following three examples are given: (1) Starch is soluble in water and polystyrene in organic solvents. When polystyrene molecules are grafted on starch macromolecules, the newly formed grafted copolymer will be soluble neither in water nor in organic solvents; however, as shown by Academician V.A. Kargin, it becomes a good emulsifier for "water-organic solvent"-type emulsions. (2) V.V. Korshak, Corresponding Member of the AN SSSR (AS USSR), has established that

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S/026/061/000/012/003/003
D037/D113

Grafted copolymers

cord made of synthetic polyamide fiber becomes considerably stronger if other polymers are grafted on the polyamide fibers. (3) Korshak also found that on the surface of lavsan films, treated with gelatine or methylmethacrylate in acrylic acid, a layer of a graft copolymer, which sticks very well to the photoemulsion, is formed. The thickness of photo- and cinefilms can be reduced 2-3 times without any loss in quality, if lavsan films are used as emulsion support. Various methods of forming graft copolymers are mentioned, the author selecting chemical methods as the best. Besides graft copolymers, block copolymers consisting of various butt-joined polymeric molecules, are widely used. Graft copolymers formed by the so-called chain transition reaction, contain the original polymer and the polymer formed during polymerization of the monomer. For synthesizing graft copolymers, polymers are used containing groups which can easily be converted into active centers. V.A. Kargin found that amorphous polymers can be grafted on crystal polymers. Professor Kolesnikov, together with Tseng Han-Ming, found that the same was true for the reverse case. Copolymers thus formed have a well ordered physical structure, the degree of which depends upon the nature of the grafted polymer, the grafting rate, and the length of the

Card 2/3

LEYTES, L.A.; YEGOROV, Yu.P.; KOLESNIKOV, G.S.; DAVYDOVA, S.L.

Study of vibrational spectra of methacrylic acid derivatives containing the elements of the IVth group. Izv.AN SSSR.Otd.khim.nauk no.11:1976-1981 N '61. (MIRA 14:11)

1. Institut organicheskoy khimii im. N.D.Zelinskogo AN SSSR i Institut elementoorganicheskikh soedineniy AN SSSR.
(Methacrylic acid--Spectra)

S/074/60/029/012/004/004
B013/B078

AUTHORS: Kolesnikov, G. S., Davydova, S. L.

TITLE: Polymerization of Non-conjugate Dienes

PERIODICAL: Uspekhi khimii, 1960, Vol. 29, No. 12, pp. 1474 - 1486

TEXT: In the present review the authors report from the field of research of cyclic polymerization. The assumption about the closing of rings during polymerization of compounds with isolated double bonds was first put forth by Simpson (Ref.1). Further confirmation of an "intramolecular cross linking" has been offered in Refs.2-4. In following years Butler and collaborators (Refs.5-13) found that polydiallyl ester of dicarboxylic acids are representatives of a large number of polymers obtained from compounds with two isolated double bonds. They show an anomalous solubility in organic solvents but no substantial non-saturation. Most of these polymers are converted by increased temperatures and pressure into transparent synthetic materials without, however, losing their solubility. These observations contradicted the common statement that linear polymers obtained from monomers with a double bond are of relatively good

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Polymerization of Non-conjugate Dienes

S/074/60/029/012/004/004
B013/B078

solubility, while those obtained by monomers with two or more double bonds show only a negligible solubility or none at all. By ascertaining numerous factors which influence polymerization Butler and Angelo (Ref.11) succeeded in establishing optimal conditions for polymerization. The mechanism suggested by them encompasses the formation of the radical from monomers and an alternate intramolecular and intermolecular transmission of the chain, resulting in a linear saturation of a chain consisting of alternating rings and methylene groups. The scheme proposed by Butler allows the formation of rings with any number of atoms. The formation of five- and six-link rings is, however, preferred. To illustrate the strong tendency of diene-1,6 as compared to monoolefins, toward polymerization, Butler suggested a scheme of intermolecular electron interaction between the non-conjugated double bonds in the molecule of the monomer. The structure of the resulting linear "cyclopolymers" was proved by Butler and his collaborators (Ref.13) for the decomposition products of polydiallyl ammonium bromide and polydiallyl dimethyl ammonium bromide. The polymerization mechanism suggested by Butler has been used by many researchers (Refs.16-54) to explain polymerization processes of a large number of other monomers. Here all familiar methods of initiation and

Card 2/3

85422

S/190/60/002/011/021/027
B004/B060

158105

AUTHORS: Kolesnikov, G. S., Tszen Khan'-min
TITLE: Carbochain Polymers and Copolymers. XXVIII. Production of
Grafted Copolymers by Interaction of Polymethyl Metha-
crylate With Polyethylene Azelainate
PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 11,
pp. 1717 - 1721

TEXT: The authors have previously (Refs. 1-4) studied the reaction of transesterification for the production of grafted copolymers. The article under consideration deals with the reaction between polymethyl methacrylate (PMMA) and polyethylene azelainate (PEA). The solvent used was chlorobenzene, the catalyst p-toluene sulfonic acid. The reaction was carried out at pH 5, 125°C during 25 hours. Results for various ratios of the two components are shown in Table 1: Dependence of grafted copolymers on the initial composition of the mixture from PMMA and PEA. Physical data and X-ray pictures show that the structure gets ordered to an ever increasing degree with increasing content of grafted branches

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85422

Carbochain Polymers and Copolymers.

S/190/60/002/011/021/027

XXVIII. Production of Grafted Copolymers

B004/B060

by Interaction of Polymethyl Methacrylate With Polyethylene Azelainate

in the copolymer. A second set of tests was carried out with PMMA : PEA = 1 : 1 under equal conditions, the reaction time, however, being prolonged to 107 hours. The copolymer yield was found to decrease over 38 hours. This is explained by esterolysis occurring between the grafted chains of the polyester and the nonreacting ester groups of PMMA. The number of grafted side chains is thus increased, but their length is reduced, which results in a lesser ordering of structure. Investigations of the thermomechanical properties showed that grafted ester chains have a plasticizing effect besides reducing the softening temperature, and confirmed esterolysis taking place when the reaction was too long. Structure and property of grafted copolymers thus do not only depend on the component ratio, but on reaction time as well. The authors mention V. V. Korshak, and thank G. L. Slonimskiy and A. I. Kitaygorodskiy for their thermal and X-ray analyses. There are 6 figures, 2 tables, and 5 Soviet references.

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Carbochain Polymers and Copolymers.
XXVIII. Production of Grafted Copolymers by
Interaction of Polymethyl Methacrylate With Polyethylene Azelinate

B/190/60/002/011/021/027
B004/B060

ASSOCIATION: Institut elementoorganicheskikh soedineniy AN SSSR
(Institute of Elemental-organic Compounds of the AS USSR)

SUBMITTED: May 30, 1960

Card 3/5

S/190/60/002/011/021/027
B004/B060

1 Состав исход- ной смеси по- лимера, %		2 Выход со- полимера от суммы исходных веществ, %	3 Присе- е исход- ному ПММА, %	4 Констан- та Хар- тмана	5 Разрыв- ная проч- ность, кг/см ²	6 Разрыв- ная удли- нение, %	7 Структура
ПММА	ПОА						
100	—	—	—	4,2	0,35	650	4 Аморфная S
80	20	88	10	3,8	0,38	590	5 Аморфная ори- ентированная
60	40	76	27	3,2	0,43	490	5 Присутствуют аморфная ори- ентированная и кристалли- ческая фазы
50	50	65	20	2,0	0,47	400	5 Кристалличес- кая
40	60	52	55	2,7	0,48	135	120 То же
20	80	51	155	1,4	0,50	95	120
—	100	—	—	0,12	—	—	120

Table 1

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85422

S/190/60/002/011/021/027
B004/B060

Legend to Table 1: 1 - Composition of initial mixture, 1a PMMA
1b PEA

- 2 - Yield
- 3 - Weight increase of initial PMMA
- 4 - Huggins constant
- 5 - Tensile strength, kg/cm^2
- 6 - Breaking length, %
- 7 - Structure
- 8 - Amorphous
- 9 - Amorphously oriented
- 10 - Amorphously oriented and crystal phase
- 11 - Crystalline
- 12 - Dto.

Card 5/5

03403

53630: also 2109,2209

S/190/60/002/009/018/019
2004/B060

AUTHORS:

Kolesnikov, G. S., Rodionova, Ye. F., Fedorova, L. S.,
Gavrikova, L. A.

TITLE:

Carbochain Polymers and Copolymers. XXVII. Polymerization
and Copolymerization of Di-n-butyl Ester of Vinyl
Phosphinic Acid

PERIODICAL:

Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 9,
pp. 1432-1437

TEXT: The authors wanted to produce a polymer of di-n-butyl-vinyl phosphinate (DBVP) with a higher molecular weight than had been obtained in previous experiments (Ref. 2). DBVP was produced by a procedure described by M. I. Kabachnik and T. Ya. Medved' (Ref. 3). The authors first applied the polymerization by the method of "molecular clusters" (molekulyarnykh puchkov) (Ref. 4): condensation of the monomer on the cooled surface of the catalyst, and subsequent thawing. An apparatus supplied by the Kafedra vysokomolekulyarnykh soyedineniy Moskovskogo gosudarstvennogo universiteta (Chair of High-molecular Compounds of Moscow State University)

Card 1/4

83483

Carbochain Polymers and Copolymers. XXVII.
Polymerization and Copolymerization of
Di-n-butyl Ester of Vinyl Phosphinic Acid

S/190/60/002/009/018/019
B004/B060

polymer led to the formation of tridimensional, insoluble products. DBVP in n-heptane at 50°C and in the presence of disperse KNa alloy yielded 43% of a polymerizate with a specific viscosity of 0.039. No high molecular weights could, thus, be obtained by any of the methods mentioned. Copolymerization of DBVP in emulsion was carried out: 1) with styrene at 60°C (Table 2); the copolymer had a molecular weight of 20,000, the 0.5% solution in benzene had a specific viscosity of 0.17; Fig. 2 shows the thermomechanical properties of the DBVP-styrene copolymer; a high phosphorus content lowers the softening temperature; 2) with vinyl chloride, DBVP at 60°C yielded copolymers of low viscosity (Table 3). With vinyl acetate, the copolymers obtained had a phosphorus content of 4.16%, the specific viscosity of their 2% ethanol solution was 0.31. The authors thank V. V. Korshak and A. M. Polyakova for having made high-pressure polymerization possible, B. L. Tsatlin for having carried out the irradiation, and G. L. Slonimskiy et al. for their determination of thermomechanical properties. There are 2 figures, 3 tables, and 7 references: 6 Soviet and 1 British.

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Carbochain Polymers and Copolymers. XXVII.
Polymerization and Copolymerization of
Di-n-butyl Ester of Vinyl Phosphinic Acid

83483
S/190/60/002/009/018/019
B004/B060

ASSOCIATION: Institut elementoorganicheskikh soedineniy AN SSSR
(Institute of Elemental-organic Compounds of the AS USSR)

SUBMITTED: May 12, 1960

Card 4/4

87032

S/190/60/002/007/016/017
B020/B052

15.8107

AUTHORS: Kolosnikov, G. S., Maloshitskiy, A. S.

TITLE: Synthesis of Unsaturated Polyamides and Polyesters by Interfacial Polycondensation

PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 7, pp. 1119-1121

TEXT: The above method was applied for the production of polyamides and polyesters from fumaric acid chloride and various diamines and diphenols. For 5 - 10 minutes fumaric acid in 0.1 mole solution of xylene was added to an aqueous 0.1 mole solution or suspension of diamine or diphenol by vigorous mixing (appr. 2500 rpms). The solution contained 2 moles of lye per one mole of diamine or diphenol. The reaction mixture was then stirred for 15 to 20 minutes and filtered. The polymer was washed with distilled water, acetone, methyl alcohol, and ether before it was dried at 50°C until the weight constant was reached. The thermomechanic curves (Fig. 1), intrinsic viscosity of a 0.5% polyamide solution in 96% of H₂SO₄, nitrogen

Card 1/2

Synthesis of Unsaturated Polyamides and Poly-
esters by Interfacial Polycondensation

87032

S/190/60/002/007/016/017
B020/B052

content (in polyamides), carbon and hydrogen contents (in polyesters) were determined, and the radiographs were taken (Fig. 2). 50-60% of the theoretical polymer yield was obtained. The results are given in a table. When heated all polyamides obtained decompose without melting. The majority of the polyamides endure temperatures of up to 250 to 280°C, although slight compression deformations occur. Synthetic polyamides have a high molecular weight. The softening of polyesters from fumaric acid chlorides sets in between 120 and 140°C. The X-ray pictures show that the polyamides and polyesters obtained have an ordered structure, and some may be called crystalline. The authors finally thank A. I. Kitaygorodskiy and G. L. Slonimskiy, and their collaborators for carrying out the X-ray analysis, and the determination of thermomechanical properties of the polymers obtained. There are 2 figures, and 1 table.

ASSOCIATION: Moskovskiy institut tonkoy khimicheskoy tekhnologii im. M. V. Lomonosova (Moscow Institute of Fine Chemical Technology imeni M. V. Lomonosov). Institut elementoorganicheskikh soyedineniy AN SSSR (Institute of Elemental-organic Compounds of the AS USSR)

SUBMITTED:

March 2, 1960

Card 2/2

TSZEN KHAN'-MIN [TSéng Han-ming]; KOLESNIKOV, G.S.

Carbochain polymers and copolymers. Part 25: Action of unsaturated
acid chlorides on polyvinyl alcohol. Vysokom.sosed. 2 no.7:
1010-1012 J1 '60. (MIRA 13:8)

1. Institut elementoorganicheskikh sovedineniy AN SSSR.
(Chlorides) (Vinyl alcohol)

KOLESNIKOV, G.S.; TSZHEN KHAN'-MIN

Carbochain polymers and copolymers. Part 24: Synthesis of graft copolymers via reaction between polymethyl methacrylate and polypentamethylenethiodivalerate. Vysokom.soed. 2 no.6:947-951 Je '60. (MIRA 13:6)

1. Institut elementoorganicheskikh soedineniy AN SSSR.
(Methacrylic acid) (Valeric acid) (Polymers)

84516

S/190/60/002/004/017/020
B004/B056

15.8/114 2109,22 09,1581

AUTHORS: Kolesnikov, G. S., Davydova, S. L., Yermolayeva, T. I.,
Shilova, N. D., Bykhovskaya, M. B.

TITLE: Carbochain Polymers and Copolymers. XXIII. The
Copolymerization of Diallyl-derivatives of Germanium, Tin,
and Silicon ¹ With Styrene ¹ and Methylmethacrylate ¹ in the
Presence of Benzoylperoxide

PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 4,
pp. 567-571

TEXT: It was the aim of the present paper to investigate the influence exerted by the content in diallyldimethylgermanium, diallyldiethylstannane, diallyldiethylsilane in the initial mixtures with respect to the composition of the polymers with styrene and methylmethacrylate. Copolymerization took place at 60°C in gasoline. The reaction lasted 8 h, concentration of the benzoylperoxide was 2% by weight, referred to the sum of the monomers. The copolymers with methylmethacrylate were found

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Carbochain Polymers and Copolymers. XXIII.
The Copolymerization of Diallyl-derivatives
of Germanium, Tin, and Silicon With Styrene
and Methylmethacrylate in the Presence of
Benzoylperoxide

84516
S/190/60/002/004/017/020
B004/B056

to be insoluble in the usual solvents. The compounds obtained were analyzed (Tables 1,2), and their thermomechanical properties were investigated (Figs. 1,2). In the copolymers with styrene, also the viscosity in benzene and the molecular weight was determined. An increasing content in elemental organic monomers in the initial mixture resulted in a decrease of the molecular weight of the copolymers. This is explained by the low activity of the elemental organic compounds. The copolymers with styrene had a lower softening temperature than polystyrene. The copolymers with methylmethacrylate showed no steric structure in the course of the thermomechanical investigation. That they are nevertheless insoluble, is explained by the very weak cross linking, which produces no effect upon the thermomechanical properties. The authors thank S. R. Rafikoy and G. L. Slonimskiy for determining the molecular weight and the thermomechanical properties. They mention papers by V. V. Korshak et al. (Refs. 1-3) and A. Ye. Borisov (Ref. 4). There are 2 figures,

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Carbochain Polymers and Copolymers. XXIII.
The Copolymerization of Diallyl-derivatives
of Germanium, Tin, and Silicon With Styrene
and Methylmethacrylate in the Presence of
Benzoylperoxide

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B004/B056

2 tables, and 4 Soviet references.

ASSOCIATION: Institut elementoorganicheskikh soedineniy AN SSSR
(Institute of Elemental Organic Compounds of the AS USSR) X

SUBMITTED:: January 15, 1960

Card 3/3

84515

S/190/60/002/004/016/020
B004/B056

15.8114 2109,2204,1581

AUTHORS: Kolesnikov, G. S., Davydova, S. L., Klimentova, N. V.

TITLE: Carbochain Polymers and Copolymers. XXII. Synthesis, Polymerization, and Copolymerization of Methacrylyltriethyl Germanium 1

PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 4, X
pp. 563-566

TEXT: It was the aim of the authors to synthesize methacryl derivatives of germanium and to produce their polymers. In the present paper, a report is given on the results obtained by the hitherto unknown methacrylyltriethyl germanium (MATEG). This compound was synthesized according to the scheme $(C_2H_5)_3GeBr + CH_2=C(CH_3)COOK$

$\xrightarrow{CH_3OH} CH_2=C(CH_3)COOGe(C_2H_5)_3$. The infrared spectrum of this compound

and, for comparison, the infrared spectrum of methylmethacrylate are

Card 1/2

Carbochain Polymers and Copolymers. XXII.
Synthesis, Polymerization, and Copolymerization
of Methacrylyltriethyl Germanium

84515
S/190/60/002/004/016/020
B004/B056

shown in Fig. 1. In the presence of benzoylperoxide or azoisobutyric acid dinitrile MATEG polymerized to form transparent products. Further, also copolymerization with methylmethacrylate and styrene was attained. Because of the low activity of MATEG, the copolymers contained considerably less MATEG than the initial mixture with methylmethacrylate (1 : 194; 1 : 239 instead of 1 : 4; 1 : 10; see Table). The thermal properties of the polymer and its copolymers are represented in Fig. 2. The polymer of MATEG softens at 180 - 185°C, its copolymer with methylmethacrylate at a lower temperature, and the copolymer with styrene at about 145°C. The authors thank G. L. Slonimskiy for the thermomechanical examination, N. A. Chumayevskiy for the infrared spectra. There are 2 figures, 1 table, and 5 references: 2 Soviet, 1 US, 1 British, and 1 German.

ASSOCIATION: Institut elementoorganicheskikh soedineniy AN SSSR
(Institute of Elemental-organic Compounds AS USSR)

SUBMITTED: January 15, 1960

Card 2/2

81587

S/190/60/002/03/11/01
B020/B066

5.383/
AUTHORS:

Kolesnikov, G. S., Suprun, A. P., Soboleva, T. A.,
Plate, A. F., Slonimskiy, G. L., Pryanishnikova, M. A.,
Tarasova, G. A.

TITLE:

Polymers and Copolymers¹ With Carbon Chains. XXI. Copolymers
on the Basis of Bicyclo (2,2,1) Heptadiene-2,5 and
1,2,3,4,7,7-Hexachloro Bicyclo (2,2,1) Heptadiene-2,5

PERIODICAL:

Vysokomolekulyarnyye soedineniya, 1960, Vol. 2, No. 3,
pp. 451-455

TEXT: The authors attempted the polymerization of dissolved bicyclo-
heptadiene and hexachloro bicycloheptadiene in the presence of BF_3 and
the polymerization of hexachloro bicycloheptadiene in the presence of
benzoyl peroxide, tert-butyl peroxide, azoisobutyric acid dinitrile,
tri-n-propyl boron, and TiCl_4 . Hexachloro bicycloheptadiene does not
form polymers (Ref. 4). Bicycloheptadiene (Ref. 5) forms polymers in
methylene chloride in the presence of BF_3 (at -70° , 4 hours) in a 75%
yield. The copolymerization of bicycloheptadiene with hexachloro

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81587

Polymers and Copolymers With Carbon Chains.
XXI. Copolymers on the Basis of Bicyclo
(2,2,1) Heptadiene-2,5 and 1,2,3,4,7,7-
-Hexachloro Bicyclo (2,2,1) Heptadiene-2,5

S/190/60/002/03/11/014
B020/B066

bicyclopentadiene and other monomers (styrene, vinyl acetate, methyl methacrylate) was studied to clarify the influence of the copolymer composition upon their solubility and thermodynamic properties. The authors synthesized copolymers from equimolecular quantities of dissolved bicycloheptadiene and hexachloro bicycloheptadiene in the presence of BF_3 (2 mole%) and in bulk in the presence of benzoyl peroxide and tri-n-propyl boron (0.5 mole%). The results obtained are given in Table 1. The curves of the thermodynamic properties of the copolymers of bicycloheptadiene and hexachloro bicycloheptadiene are presented in Fig. 1. According to an X-ray structural analysis, the resultant copolymers are amorphous. The properties of copolymers from equimolecular quantities of bicycloheptadiene and styrene are also given (Table 2). The results of the copolymerization of equimolecular quantities of bicycloheptadiene with methyl methacrylate in bulk in the presence of azoisobutyric acid dinitrile, benzoyl peroxide, and tert-butyl peroxide showed that the activity of methyl methacrylate

Card 2/4

Polymers and Copolymers With Carbon Chains.
XXI. Copolymers on the Basis of Bicyclo
(2,2,1) Heptadiene-2,5 and 1,2,3,4,7,7-
-Hexachloro Bicyclo (2,2,1) Heptadiene-2,5

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S/190/60/002/03/11/011
B020/B066

is much higher than that of bicycloheptadiene. The copolymers obtained contain a total of about 1 per cent of bicycloheptadiene links, which is not sufficient for an increase of the thermal stability of polymethyl methacrylate. The curves of the thermodynamic properties of the copolymers of bicycloheptadiene and styrene, as well as of bicycloheptadiene and vinyl acetate are given in Fig. 2. The latter copolymer was synthesized for the first time. The copolymers of bicycloheptadiene and hexachloro bicycloheptadiene with a molar ratio of 70.5 : 29.5 are well soluble in dichloro ethane and toluene, and are highly elastic at elevated temperatures (250 - 350°). The copolymer of bicycloheptadiene and vinyl acetate is also highly elastic in a wide temperature range (60 - 350°). There are 2 figures, 2 tables, and 6 references: 3 Soviet, 2 US, and 1 British. 44

ASSOCIATION: Institut elementoorganicheskikh sovedineniy (Institute of Elemental-organic Compounds). Institut organicheskoy khimii im. N. D. Zelinskogo AN SSSR (Institute of Organic

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